

Impact of UV together with dry-aging on meat quality of beef loins (*M. longissimus thoracis et lumborum*) from pasture-based production systems

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Objective: A consequence of dry-aging is yield loss due to moisture and trim losses. Coupling dry-aging with a *post-mortem* inter-vention may help understand and possibly alleviate this issue. We evaluated the effect that ultraviolet (UV) together with dry-aging has on drying kinetics and quality of beef from pasturebased production systems. We hypothesized that a high UV exposure might cause protein crosslinking and structural changes on the meat surface, which might act as an additional barrier to moisture evapora- tion and benefit in terms of overall yield.

Materials and Methods: At 3 days *post-mortem*, striploins (*M. longissimus thoracis et lumborum*) from the left and right-hand side of 6 beef carcasses were divided into equal 4 sections (yielding n = 8 sections/carcass), and randomly assigned to one of the eight treatment combinations; treatment (control, UV) x days of dry-aging (0, 21, 28 and 48 d). Note that 48d measurements are not pre- sented in this abstract. UV treatment was applied before dry-aging using a UV Torpedo Conveyor (JenActUV, UK) with an intensi- ty of 18.91 ± 0.99 W/m², wavelength of 254nm, and static conveyor belt. Four sections at a time were treated for 10 min, and then, turned upside down before repeating the treatment for 10 minutes. Sections were dry-aged [2 °C, 75% RH, air flow range of 0.5-2.0 m/s, DRY AGER DX 1000® (DRY AGER®, Germany)] and quality analysis (proximate analysis, drip loss, and yield (assessed by measuring weight loss, trim loss, and combined loss)) performed at 0, 21, and 28 of dry-aging. Lipid oxidation (TBARS) was determined in the lean (internal location) and on the surface/crust (external location) at each aging time point. Two-Way ANOVA with blocking was employed. Animals were treated as blocks and a significance level of $p < 0.05$ was selected. Mean comparisons were made using Tukey's Test.

Results and Discussion: No interactive effect was observed for treatment x dry-aging day. While a small effect was observed in ash values, in general the UV treatment had no effect on proximate analysis, drip loss or yield. Duration of dry-aging influenced moisture, protein, ash and drip loss. Changes in protein and ash are likely related to changes in moisture content. Drip loss significantly decreased after day 0 of dryaging; with no significant differences between day 21 and 28. Dehydration during dry-aging generates a moisture gradient, which ultimately leads to a crust formation as aging progresses. Both phenomena can influence water removal during aging. While in the UV group, a higher trim loss was observed after 28d of dry-aging compared to 21d, no significant differ- ence was observed for combined losses. Dry-aging had an influence on lipid oxidation on the surface of the meat. Within both control and UV treated groups, TBARS increased in the crust at both 21d and 28d of dry-aging. An effect of UV treatment was ob- served after dry-aging with a significant increase in TBARS values in the crust at 28d. UV is considered to be a surface treatment due to its limited penetrative capacity; hence it is understandable that it could trigger a lipid oxidation effect on external rather than internal locations. In addition, crust formation during dry-aging may act as a protective layer, limiting oxygen transfer (Setyabrata et al., 2022) and further lipid oxidation in inner locations. None of the groups are exceeding the threshold for unacceptable rancid flavour in beef (2 mg of malonaldehyde per kilogram) proposed by Campo et al. (2006). While this UV treatment did not have an effect on the drying process, the TBARS results suggest that the trim would not have undesirable flavour characteristics and may hold potential for re-valorisation.

Conclusions: In general, meat quality results were in line with other studies on beef dry-aging and the application of UV did not have any obvious impact on trim losses or moisture levels. Oxidation levels did increase on the external surface of the meat following UV treatment. These levels did not exceed the threshold for unacceptable rancid flavour in beef.

References:

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Key words: Dry-aging, Ultraviolet, Meat quality, Lipid oxidation